ASSIGNMENT 4

Textbook Assignment: "Diesel Fuel Systems," chapter 5, pages 5-1 through 5-54.

4-1. What factor makes it possible to ignite the air-fuel mixture of a diesel engine without the use of a spark plug as required in a gasoline engine?

1. The ignition temperature of diesel fuel is low
2. The compression ratio of the diesel engine is low
3. The compression temperature of the diesel engine is high
4. The speed of the diesel engine's moving parts is high

4-2. What action controls the speed of a diesel engine?

1. Regulation of the amount of fuel delivered to the engine's cylinders
2. Alteration of the compression pressure within the engine's cylinders
3. Regulation of the volume of air entering the cylinders
4. Limitation of the capacity of the fuel injection system

4-3. Which of the following characteristics is one advantage of the diesel engine over the gasoline engine?

1. Low production cost
2. Suitability for vehicles transporting small loads
3. Smoothness of operation
4. High ratio of power output to fuel consumed

4-4. Which of the following items is NOT considered a disadvantage of the diesel engine as compared to the gasoline engine?

1. High cost of manufacture
2. Heavier construction required to withstand high compression pressures
3. Difficulty in starting
4. Less of a fire hazard

4-5. What agency is responsible for grading diesel fuel?

1. Society of Automotive Engineers
2. American Petroleum Institute
3. American Society for Testing And Materials
4. Society of Automotive Petroleum

4-6. What grade of diesel fuel is used in truck fleets because of its greater heat value?

1. 1D
2. 2D
3. 3D
4. 4D

4-7. Which of the following factors must be considered when selecting a fuel oil?

1. Engine size and design
2. Fuel cost and availability
3. Atmospheric conditions
4. Speed and load range

4-8. The measure of the volatility of a diesel fuel is known as

1. cetane number
2. octane number
3. distillation number
4. stability number

4-9. If the cetane number of a diesel fuel is too low, which of the following conditions can result?

1. Pre-ignition
2. Difficulty in starting
3. Puffs of blue smoke during start-up
4. Detonation

4-10. Current diesel fuels have a cetane rating that ranges between

1. 20 and 25
2. 30 and 35
3. 40 and 45
4. 50 and 55

4-11. Low volatile fuels tend to provide better fuel economy and produce

1. more crankcase dilution
2. higher exhaust temperature
3. less exhaust smoke
4. less lubrication

4-12. Which of the following properties has a direct bearing on the life expectancy of the engine and its components?

1. Sulfur content
2. Viscosity
3. Volitilty
4. Cleanliness and stability

4-13. Which of the following combustion chamber designs is the simplest form?

1. Precombustion
2. Spherical
3. Turbulence
4. Open

4-14. Which of the following combustion chamber designs requires the highest fuel injection pressure?

1. Open
2. Precombustion
3. Turbulence
4. Spherical

4-15. When precombustion chambers are used on a diesel engine, which of the following factors cause the greatest amount of fuel atomization?

1. Rapid air movement within the cylinders
2. High fuel injection pressure
3. Dispersion of fuel from the multi-orifice fuel injectors
4. Turbulence within the precombustion chamber

4-16. Which of the following combustion chamber designs is principally used in the multifuel engine?

1. Turbulence
2. Spherical
3. Open
4. Precombustion

4-17. Which of the following components is designed to prevent an engine from overspeeding and allow the engine to meet changing load conditions?

1. Fuel pump
2. Carburetor
3. Throttle valve
4. Governor

4-18. At what location is the governor connected on a diesel engine?

1. Next to the fuel pump
2. Between the throttle and the fuel injector
3. Between the fuel pump and the fuel filter
4. Between the fuel filter and throttle

4-19. Which of the following terms is used to describe the change in speed required before the governor makes a corrective movement of the throttle?

1. State of balance
2. Isochronous
3. Deadband
4. Response time

4-20. What type of governor prevents an engine from exceeding a specified maximum speed?

1. Limiting-speed
2. Constant-speed
3. Variable-speed
4. Load-control

4-21. What type of governor maintains any specified engine speed between idle and maximum speed?

1. Load-limiting
2. Load-control
3. Pressure-regulating
4. Variable-speed

4-22. Which of the following governors provides a regular or stable engine speed, regardless of load conditions?

1. Variable-speed
2. Constant-speed
3. Load-control
4. Pressure-regulating

4-23. What part of a spring-loaded mechanical governor does the manual throttle directly adjust?

1. Linkage between flyballs and injectors
2. Spring tension
3. Position of flyballs
4. Centrifugal-force generator

4-24. The tension of the spring in the mechanical flyweight governor has a tendency to

1. stabilize the amount of fuel delivered to the cylinders
2. reduce the amount of fuel delivered to the cylinders
3. increase the amount of fuel delivered to the cylinders
4. increase and reduce the amount of fuel delivered to the cylinders

4-25. For engine speed to stabilize, what condition must exist within the governor?

1. Centrifugal force must overcome spring tension
2. Spring tension must overcome centrifugal force
3. Centrifugal force and spring tension must balance fuel supply pressure
4. Centrifugal force and spring tension must be equalized

4-26. Which of the following is NOT an advantage of a mechanical governor?

1. Inexpensive to manufacture
2. Very simple, few parts
3. Large deadbands
4. Not required to maintain the same speed, regardless of load

4-27. The hydraulic governor is inherently unstable. To maintain stability, hydraulic governors employ

1. speed droop
2. deadbands
3. sensitivity
4. isochronous

4-28. In an electronic governor, at what location is the magnetic pickup sensor installed?

1. Next to a drive shaft gear
2. Between the crankshaft and electronic control module
3. Between the flyweights and springs
4. Next to the idle speed control

4-29. Sediment or water is prevented from entering the fuel system because the inlet fuel line is approximately 2 inches from the bottom of the tank.

1. True
2. False

4-30. The secondary fuel filter should be capable of removing dirt particles of what size?

1. Between 5 to 7 microns
2. Between 7 to 9 microns
3. Between 10 to 12 microns
4. Between 13 to 15 microns

4-31. Why is it necessary to have a supply pump to transfer fuel from the tank to the injection pump of a diesel engine?

1. Because the injection pump will not create sufficient suction
2. Because the fuel filters pass fuel only under pressure
3. Because the injection pump will deliver excessive fuel to the engine
4. Because use of the injection pump alone will cause the fuel system to become airbound

4-32. Which of following types of supply pumps are used on a diesel engine?

1. Electric
2. Wobble-plate
3. Rotary
4. Gear

4-33. What are the five functions of a diesel fuel system?

1. Measure, introduce, timed, atomization, and create force
2. Meter, inject, time, atomize, and create pressure
3. Measurable, insert, timing, atomiferous, and catalyze
4. Metered, introjection, timer, atomism, and catalysis

4-34. The rate at which fuel is injected also determines the rate of

1. combustion
2. speed
3. timing
4. distribution

4-35. What type of injection system is used on Caterpillar diesel engines?

1. Unit injection
2. Pump and nozzle
3. Distributor
4. Pressure time

4-36. What action varies the metering of fuel in a Caterpillar injection system?

1. An increase and decrease in the nozzle orifices
2. Controlled cam and spring action
3. Turning of the plungers in the barrels
4. Turning of the rack and pinion

4-37. Which of the following features was NOT a design consideration in the Caterpillar sleeve metering fuel system?

1. Fewer moving parts
2. A hydraulic assist governor
3. Fuel lubricates all internal parts
4. Transfer pump, governor, and injection pump all in one unit

4-38. With the engine operating at full load, the transfer pump fills the injection pump housing with fuel at approximately

1. 10 to 15 psi
2. 20 to 25 psi
3. 30 to 35 psi
4. 40 to 45 psi

4-39. At approximately what rate does the constant bleed valve return fuel back to the fuel tank?

1. 2 gallons per hour
2. 5 gallons per hour
3. 9 gallons per hour
4. 12 gallons per hour

4-40. What type of governor is used on the sleeve metering fuel system?

1. Mechanical
2. Hydraulic
3. Electronic
4. Hydromechanical

4-41. The automatic timing advance on a sleeve metering fuel system is at what location?

1. On the rear of the engine camshaft
2. On the rear of the engine crankshaft
3. On the front of the engine camshaft
4. On the front of the engine crankshaft

4-42. On a 3406 Caterpillar engine using a scroll metering system, what is the opening pressure of the injection nozzle?

1. Between 1200 and 2350 psi
2. Between 1750 and 2500 psi
3. Between 2000 and 2800 psi
4. Between 2400 and 3100 psi

4-43. What type of governor is used in a scroll metering fuel system?

1. Hydromechanical
2. Mechanical
3. Hydraulic
4. Electronic

4-44. What type of seal is used to prevent engine oil from entering the DB2 fuel pump?

1. Two cone seals
2. Two lip seals
3. Two O rings
4. Two Quad-X rings

4-45. In a DB2 fuel pump, the hydraulic head has a number of charging and discharging ports. This design feature is based on the

1. maximum speed of the engine
2. volume requirements of the engine
3. pressure requirements of the engine
4. number of engine cylinders

4-46. What type of transfer pump is used in the DB2 fuel pump?

1. Positive displacement vane type
2. Positive displacement rotary type
3. Positive displacement electric type
4. Positive displacement piston type

4-47. What action limits the maximum amount of fuel that can be injected by the DB2 fuel pump?

1. The outward travel of the plungers
2. The roller shoes contacting the leaf spring
3. The opening of the charging ports
4. The movement of the cam lobes

4-48. What component in a DB2 fuel pump serves as a cushion between the governor weight retainer and the weight retainer hub?

1. Flexible governor drive
2. Governor pillow
3. Governor torque drive
4. Flexible torque drive

4-49. Which of the following factors does NOT affect the torque of a DB2 fuel pump?

1. The metering valve opening area
2. The time allowed for fuel charging
3. The transfer pump pressure curve
4. The reduced fuel flow to the pumping plungers

4-50. What component controls the amount of fuel delivered at full-load governor speed?

1. Flexible governor drive
2. Torque screw
3. Metering valve
4. Pumping plungers

4-51. What component maintains fuel pressure within the governor housing on a DB2 fuel pump?

1. Spring-loaded poppet valve
2. Spring-loaded ball-check valve
3. Constant bleed valve
4. Delivery valve

4-52. When repairing a fuel pump on a Detroit diesel, you should NOT use any type of gasket material.

1. True
2. False

4-53. A hole of what diameter is indicated when the restricted fitting on a Detroit diesel engine is stamped R60?

1. 0.0006
2. 0.006
3. 0.060
4. 0.60

4-54. By what means are the injector control racks actuated on the Detroit diesel engine?

1. Camshaft lobes
2. A lever on the injector control tube
3. Fuel pressure
4. Rocker arms and camshaft lobes

4-55. Which of the following conditions must exist on a Detroit unit injector before it can inject fuel?

1. The lower port must be open and the upper port closed
2. The lower port must be closed and the upper port open
3. The lower and upper ports must be closed
4. The lower and upper ports must be open

4-56. When properly timing an unit injector, the injector follower height is adjusted by using which of the following tools?

1. Timing pin gauge
2. Timing light
3. Timing depth gauge
4. Timing height caliper

4-57. Unit injectors are equalized by adjusting the

1. length of stroke of the injector plunger
2. diameter of the injector valve orifices
3. control rack levers
4. amount of centrifugal force exerted on the governor flyweights

4-58. When troubleshooting a Detroit diesel engine, one cylinder has a lower temperature than the others. To supply this cylinder with more fuel, you must make what adjustment to the control rack?

1. Tighten the inner screw after loosening the outer screw
2. Tighten the outer screw after loosening the inner screw
3. Loosen the inner screw but maintain the setting of the outer screw
4. Loosen the outer screw but maintain the setting of the inner screw

4-59. Which of the following governors are NOT used on Detroit diesel engines?

1. Limiting speed mechanical
2. Woodward PSG hydraulic
3. Dual-range limiting speed mechanical
4. Variable high-speed hydraulic

4-60. Engines requiring a minimum and maximum automatic speed control and a manually intermediate speed control are equipped with what type of governor?

1. Woodward electric
2. Hydraulic
3. Limiting speed mechanical
4. Variable speed mechanical

4-61. The PTG-AFC fuel pump meters fuel to the injectors.

1. True
2. False

4-62. The PTG-AFC fuel pump is NOT timed to the engine.

1. True
2. False

4-63. In the PTG-AFC fuel pump, the AFC plunger position is determined

1. by the amount of turbocharger boost pressure in the exhaust manifold
2. by the amount of turbocharger boost pressure in the intake manifold
3. by the amount of supercharger boost pressure in the intake manifold
4. by the amount of supercharger boost pressure in the exhaust manifold

4-64. After replacing the injectors in a Cummins PT fuel system, they are readjusted after the engine has been warmed up. What should the engine oil temperature read after the warm-up?

1. Between 120° and 140°
2. Between 110° and 130°
3. Between 140° and 160°
4. Between 160° and 180°

4-65. When overhauling a set of PT fuel injectors, you must keep them together because they are matched sets.

1. True
2. False

4-66. What sensor in the Cummins Celect system is used by the electronic control module to determine the basic operating altitude of a vehicle?

1. Engine position
2. Intake manifold temperature
3. Ambient air pressure
4. Vehicle speed

4-67. How much pressure is the fuel pump in the Celect fuel system designed to deliver to the fuel manifold?

1. 110 psi
2. 120 psi
3. 130 psi
4. 140 psi

4-68. What type of pump is the American Bosch Model PSB?

1. Variable-stroke, distributing plunger, and sleeve-control
2. Constant-stroke, distributing plunger, and sleeve-control
3. Variable-stroke, distributing plunger, and rack-control
4. Constant-stroke, distributing plunger, and rack-control

4-69. What is the function of the fuel density compensator?

1. Varies the viscosity of the fuel injected into the engine
2. Varies injection pressure of the fuel
3. Varies the quantity of fuel injected into the engine
4. Varies fuel pressure entering the fuel pump

4-70. Which of the following is NOT a type of supercharger?

1. Diaphragm
2. Centrifugal
3. Rotor
4. Vane

4-71. A turbocharger is driven by the exhaust.

1. True
2. False

4-72. What type of cold weather starting devices uses a spark plug to ignite fuel vapors to heat the air before it enters the combustion chamber?

1. Glow plugs
2. Manifold flame heater
3. Ether
4. Fuel/spark control heater

4-73. Which of the following conditions does NOT cause an abnormal amount of black smoke to come from a diesel engine?

1. Improper grade of diesel fuel
2. Low cetane diesel fuel
3. Faulty automatic timing advance unit
4. Incorrect valve adjustment clearances

4-74. Blue smoke coming from the exhaust indicates the existence of what condition?

1. High exhaust back pressure
2. Water leaking into the combustion chamber
3. Low cylinder compression from worn rings
4. Oil entering the combustion chamber

4-75. How is a quick injector misfire check performed on a Detroit diesel?

1. Loosen the injector fuel lines
2. Loosen the fuel pump lines
3. Press down on the injector follower
4. Press down on the injector plunger